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4. Unpublished Academic Theses

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AUTOBIOGRAPHY

Research Geologist, U.S. Geological Survey, Denver, CO (10/1982 to present)

For the past fourteen years I have conducted research on the occurrence, fate, and transport of organic compounds in surface and ground water. This research involves quantitative integration of chemistry, microbiology, hydrology, and geology in evaluating the environmental fate of organic chemicals. Specific responsibilities include: (1) design field programs for collection and analysis of water and sediment chemistry data to evaluate environmental processes, (2) maintain and operate gas chromatograph/mass spectrometer, high performance liquid chromatograph, automated solid-phase extraction system, organic carbon analyzer, and a variety of other analytical instruments for the measurement of trace-organic compounds in water and sediments, (3) conduct geological evaluation of subsurface hydrological systems by determining stratigraphy and mineralogy from analysis of cores by particle size analysis, density and magnetic separations, optical and electron microscopy, and x-ray diffraction analysis, and (4) compile and interpret chemical, geological, microbiological, and hydrological data within an integrated multidisciplinary framework.

1982-1985: Conduct field sampling and laboratory analysis to determine the occurrence and distribution of organic and inorganic contaminants in ground water at the Cape Cod site. Evaluate the biological and geochemical factors controlling organic contaminant fate in ground water. Promoted from GS-5 to GS-7 (1984).

1985-1990: (1) Investigate the mechanisms of organic contaminant sorption onto aquifer sediments and the effect of sediment mineralogy on sorption by separating the various mineralogical components of complex natural sediments and determining their sorption properties by laboratory experiments; (2) quantify the spatial variability of sediment geochemical and hydrological properties through extensive field coring program; (3) integrate the sediment chemical properties controlling sorption with hydrology through a particle size function, which allows incorporation of geochemical heterogeneity into solute transport models; (4) develop analytical methodology for determining very polar organic compounds (surfactants) in water by solid-phase extraction/derivatization/gas chromatography/mass spectrometry. Promoted from GS-7 to GS-9 (1986), from GS-9, to GS-11 (1988), and GS-11 to GS-12 (1990).

1990-1993: Conduct field and laboratory investigation into occurrence and distribution of sewage-derived organic contaminants in the Mississippi river as a function of spatial/temporal/hydrological factors; apply analytical methodologies developed for surfactant derived compounds. Promoted from GS-12 to GS-13, 1992.

1993-present: Complete chemical and data analysis and report preparation on the Mississippi River study. Continue work an cooperative study with the BR to evaluate the transformation of organic compounds in sewage effluents as they pass through constructed and natural wetlands. Continue research on organic geochemistry at the Cape Cod Toxics Research Site, including conducting *in situ* natural gradient tracer experiments to evaluate the biogeochemical fate of surfactants in ground water. Conducting watershed scale investigation of the sources and flux of dissolved organic matter in the Boulder Creek, Colorado Watershed.

PROJECT DESCRIPTION

I have worked on Jerry Leenheer's Comprehensive Organic Analysis project since 1989. The overall project objective is to study the occurrence, nature, and processes controlling the reactions and fate of organic matter in natural waters. This objective is accomplished by using a broad spectrum analytical approach to measuring organic matter and its characteristics in water. These measurements are coupled with laboratory and field scale experiments to quantify the processes controlling the fate of organic matter in natural aqueous environments.

My laboratory is located in a separate facility from the project chief and I function as an independent subproject. I have significant control of my research direction, approach, and methods and I operate with minimal guidance from the project chief.

My primary duties are to conduct research on the occurrence and fate of organic contaminants in surface and ground water. Specific tasks that I am in charge of include (1) maintain and supervise use of a variety of organic analytical instruments including a gas chromatograph/mass spectrometry for the analysis of trace-organic compounds, (2) conduct field investigations and experiments to evaluate the occurrence, distribution, and fate of natural and contaminant organic matter in surface and ground water, (3) conduct laboratory experiments to determine the mechanisms of sorption and biodegradation of organic contaminants, (4) prepare journal articles and technical reports on the results of the field and laboratory studies, (5) present results at national scientific meetings. All of these tasks are performed under my own direction. In addition, I have supervisory responsibilities for professional staff and student appointments.

SCIENTIFIC LEADERSHIP

My most significant nonpublication contribution is involvement in community outreach and education on technical issues related to the Boulder Creek Watershed (BCW). I have been involved with these outreach efforts for the past 4 years, and have helped organize a series of forums to inform the Boulder Community on the scientific and cultural characteristics of the BCW. These activities have increased public awareness of the USGS and our research on the nations water resources. As part of this effort I have been coordinating research activities being conducted by several City Departments and University of Colorado Research groups. I am currently organizing a 12 month series of lectures by Boulders' local preeminent scientists and water resources experts to discuss topical issues related to the current and future demands that will be placed on the BCW.

In addition to the above, I also have been directly involved in educational outreach in the local school system. These activities include conducting field trips, speaking to classes about environmental and career topics, judging science fairs, mentoring students, and serving on various committees related to scientific and environmental education.